WHAT IS CLAIMED IS:

1. A dielectric resonator device comprising:

a cavity;

a dielectric core disposed in the cavity; and

a support base attached to the dielectric core,

wherein the support base is fixed relative to an inner surface of the cavity such that an air space is located between the dielectric core and the inner surface of the cavity.

2. The dielectric resonator device according to claim 1, wherein an outer shape of the support base is larger than a bottom surface of the dielectric core which is in contact with the support base.

3. The dielectric resonator device according to claim 1, wherein a hole is formed in the support base at a position opposing a bottom surface of the dielectric core to form the air space between the dielectric core and the inner surface of the cavity.

4. The dielectric resonator device according to claim 3, further comprising support columns fixed on the inner surface of the cavity, the support base being fixed on the support columns.

5. The dielectric resonator device according to claim 1, further comprising support columns fixed on the inner surface of the cavity, the support base being fixed on the support columns to form the air space between the dielectric core and the inner surface of the cavity.

6. The dielectric resonator device according to claim 5, wherein the support columns are integrally formed with the inner surface of the cavity.

7. The dielectric resonator device according to claim 5, wherein the support columns are positioned along a periphery of the support base.

8. The dielectric resonator device according to claim 1, wherein a first surface of the cavity and a second surface of the cavity opposing the first surface are connected to each other via a conductor wire passing through substantially a center of the dielectric core.

9. The dielectric resonator device according to claim 8, wherein the conductor wire passes through substantially the center of the dielectric core in a z-axis direction.

10. The dielectric resonator device according to claim 1, wherein first opposing surfaces of the cavity are connected to each other by a first conductor wire passing through substantially a center of the dielectric core in a x-axis direction, second opposing surfaces of the cavity are connected to each other by a second conductor wire passing through substantially the center of the dielectric core in a y-axis direction, and third opposing surfaces of the cavity are connected to each other by a third conductor wire passing through substantially the center of the dielectric core in a z-axis direction.

11. A dielectric filter comprising:

the dielectric resonator device set forth in claim 1; and

an external coupling unit being externally coupled to the dielectric resonator device.

12. A composite dielectric filter comprising:

at least two of the dielectric filter set forth in claim 11;

wherein the external coupling unit of one of the at least two dielectric filters is a common coupling unit for the composite dielectric filter.

13. A communication apparatus comprising:

a high frequency circuit; and

the dielectric filter set forth in claim 11 provided in the high frequency circuit.

14. A dielectric resonator device comprising:

a dielectric core disposed in a cavity,

wherein first opposing surfaces of the cavity are connected to each other via a first conductor wire passing through substantially a center of the dielectric core.

15. The dielectric resonator device according to claim 14, wherein the first conductor wire passes through substantially the center of the dielectric core in a z-axis direction.

16. The dielectric resonator device according to claim 15, wherein second opposing surfaces of the cavity are connected to each other by a second conductor wire passing through substantially the center of the dielectric core in an x-axis direction, and third opposing surfaces of the cavity are connected to each other by a third conductor wire passing through substantially the center of the dielectric core in a y-axis direction.

17. A dielectric filter comprising:

the dielectric resonator device set forth in claim 14; and

an external coupling unit being externally coupled to the dielectric resonator device.

18. A communication apparatus comprising:

a high frequency circuit; and

the dielectric filter set forth in claim 17 provided in the high frequency circuit.

19. A composite dielectric filter comprising:

at least two of the dielectric filter set forth in claim 17;

wherein the external coupling unit of one of the dielectric filters is a common coupling unit for the composite dielectric filter.

20. A communication apparatus comprising:

a high frequency circuit; and

the composite dielectric filter set forth in claim 19 provided in the high frequency circuit.